Claims

1) Method for the digital synthesis of the sound of church organ flue pipes, characterised by the fact that:

- it generates a sequence composed of a series of harmonic components, of which the fundamental frequency, the phase and the time progression of the wave envelope are predetermined,
- it generates an aleatory sequence whose spectrum varies in time according to a synchronous periodic progression with respect to the sequence composed of a series of harmonic components,
- it processes the two sequences through a cycle of linear functional blocks, characterised by an impulse response whose spectrum has at least one resonance frequency, with the possibility of modifying the spectrum in real time and non-real time, thus obtaining a variation of the spectrum of the sequence processed by the closed cycle, without affecting the fundamental period of the sequence.

2) Electronic device for the synthesis of sounds according to the method as defined in claim 1, characterised by the fact that it includes:

- a section defined as "harmonic component generator" (9) that autonomously generates a "main harmonic sequence" (10) composed of a series of harmonic lines, whose fundamental frequency depends on the information received from musical instruments,
- a section defined as "aleatory component generator" (11) that autonomously generates a pseudoaleatory sequence, whose energy changes in time according to the progression of a periodic sequence, whose fundamental frequency depends on the fundamental frequency of the "main harmonic sequence" (10),
- a closed cycle section defined as "linear resonator" (12), which contains at least one delay line whose length depends on the information received from musical instruments; by processing the two sequences generated by the "harmonic component generator" (9) and "aleatory component generator" (11) the section generates a sequence (13) that represents the product of the

electronic device for the synthesis of sounds.

3) Device as defined in claim 2, characterised by the fact that the "harmonic component generator" (9) processes a periodic sequence (16) generated by the device through a series of linear and non-linear, instantaneous and with memory, constant and time-variant functional blocks, thus obtaining the "main harmonic sequence" (10) formed by one or more harmonic lines, whose frequencies are multiples of the frequency of the periodic sequence (16) and whose amplitudes vary differently in time.

4) Device as defined in claim 3, characterised by the fact that the "harmonic component generator" (9) produces a periodic sequence (16) by means of an harmonic oscillator (14) formed by a closed cycle that contains two linear filters (29) and (31) and characterised by control blocks (30) and (32) that maintain the amplitude of the periodic sequence constant, making the oscillator stable in case of operational frequency variations.

5) Device as defined in claim 3, characterised by the fact that the "harmonic component generator" (9) produces the "main harmonic sequence" (10) whose fundamental frequency, depending on the information received from musical instruments, may vary according to a combination between a low frequency oscillating variable (33) and an aleatory variable (34) whose value changes with a frequency that depends on the fundamental frequency of the "main harmonic sequence" (10).

6) Device as defined in claim 3, characterised by the fact that the "harmonic component generator" (9) includes at least one filter along the series of functional blocks, whose project frequency depends on the fundamental frequency of the "main harmonic sequence" (10).

7) Device as defined in claim 3, characterised by the fact that the "harmonic component generator" (9) processes in a parallel way a first harmonic sequence (16) generated by an harmonic oscillator (14) and a second harmonic sequence (17) whose fundamental frequency is a multiple of the fundamental frequency of the first sequence (16), so that the amplitudes of the two harmonic sequences have independent time progressions.

8) Device as defined in claim 3, characterised by the fact that the "harmonic

component generator" (9) includes at least one non linear function that enriches the harmonic contents of the sequence (16) generated by the harmonic oscillator (14).

9) Device as defined in claim 2, characterised by the fact that the "aleatory component generator" (11) processes a white aleatory sequence (40), producing an aleatory sequence in which the difference between two consecutive samples is limited according to the progression of a periodic sequence whose frequency depends on the fundamental frequency of the "main harmonic sequence" (10).

10) Device as defined in claim 2, characterised by the fact that the "aleatory component generator" (11) includes one time-variant filter, whose transfer function varies in a cyclic way with a periodicity that is function of the fundamental frequency of the "main harmonic sequence" (10).

11) Device as defined in claim 2, characterised by the fact that the "linear resonator" (12) is formed by a closed cycle of linear functional blocks, along which the sequences produced by the "harmonic component generator" (9) and the "aleatory component generator" (11) are injected, being the closed cycle characterised by a frequency response that depends on the information received from musical instruments, and being the harmonic composition of the sequence produced by the "harmonic component generator" (9) independent from the frequency response of the closed cycle, so as to modify such response in real time and in non-real time, without altering the value of the fundamental frequency of the sequence processed by the closed cycle.